**IN THE CLAIMS**:

1. (Original) An MR system comprising:

a magnetic resonance imaging (MRI) system having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field and an RF transceiver system to acquire MR images; and

a computer programmed to:

generate phase-difference images from a first acquisition and a second acquisition;

determine a non-zero background phase from the phase-difference images that are due to eddy currents induced by flow encoding gradients used to generate the phase-difference images;

remove the non-zero background phase from the phase-difference images; and

determine phase associated with flowing spins and phase associated with stationary spins.

2. (Original) The MR scanner of claim 1 wherein the computer is further programmed to reconstruct a phase contrast image with contrast between flowing spins and stationary spins.

3. (Original) The MR scanner of claim 1 wherein the computer is further programmed to:

determine a degree of pulsatility of an object;

compare the degree of pulsatility to a pulsatility threshold; and

determine inclusion of the object in a background image from the comparison.

4. (Original) The MR scanner of claim 3 wherein the computer is further programmed to exclude the object in the background image if the degree of pulsatility of the object exceeds the pulsatility threshold.

5. (Original) The MR scanner of claim 1 wherein the computer is further programmed to generate a mask image from those objects not pulsating at a temporal frequency above a frequency threshold.

6. (Original) The MR scanner of claim 5 wherein the frequency threshold is 0 Hertz.

7. (Original) The MR scanner of claim 6 wherein the computer is further programmed to generate a temporal frequency power spectrum on a per pixel basis, and if a given fraction of the temporal frequency power spectrum for a given pixel exceeds the frequency threshold, exclude the given pixel from inclusion in the mask image.

8. (Original) The MR scanner of claim 7 wherein the computer is further programmed to exclude a pixel from inclusion in the mask image if more than 15 percent of pixel energy is at or above the frequency threshold.

9. (Original) The MR scanner of claim 5 wherein the computer is further programmed to subtract the mask image from a phase-difference image to remove that portion of the phase-difference image corresponding to background phase.

10. (Original) The MR scanner of claim 1 wherein the gradient coils are further configured to apply flow-encoding gradients with a non-zero first moment to encode spins with a phase proportional to their velocity.

11. (Original) The MR scanner of claim 9 wherein the computer is further programmed to subtract background phase from the phase-difference image for each phase of a cardiac cycle.

12. (Original) The MR scanner of claim 9 wherein the computer is further programmed to subtract background phase from the phase-difference image along a plurality of flow directions.

13. (Original) The MR scanner of claim 3 wherein the computer is further programmed to determine inclusion of the object in a background image on a per slice basis.

14. (Original) A method of phase correction in flow analysis MR imaging comprising the steps of:

determining temporal frequency components for a given pixel of a phase-difference image;

generating a power spectrum of the given pixel from the temporal frequency components;

determining percentage of the power spectrum within a given energy range; and

including the pixel in a mask image if a given percentage of the power spectrum for the pixel is at a given energy.

15. (Original) The method of claim 14 further comprising the step of including the pixel in the mask image if less than 15 percent of the power spectrum for the pixel is at the given energy.

16. (Original) The method of claim 14 wherein the given energy is DC.

17. (Original) The method of claim 14 further comprising the step of applying the mask image to the phase-difference image and generate a set of masked phase-difference pixels.

18. (Original) The method of claim 17 further comprising the step of determining a set of fit coefficients of a representative polynomial expression from the set of masked phase-difference pixels.

19. (Original) The method of claim 18 further comprising the step of determining background phase in the phase-difference image from the set of fit coefficients.

20. (Original) The method of claim 19 further comprising the step of subtracting background phase from the phrase-difference image and generating a corrected phase-difference image.

21. (Original) The method of claim 20 further comprising the step of generating a corrected phase-difference image for each slice of a plurality of imaged slices.

22. (Original) The method of claim 20 further comprising the step of subtracting background phase from the phase-difference image on at least one of a per flow direction and a per cardiac phase basis.

23. (Original) The method of claim 18 wherein the representative polynomial expression is a first order expression.

24. (Original) The method of claim 14 further comprising the steps summing the temporal frequency component for a first harmonic and the temporal frequency component for a second harmonic of the power spectrum for the given pixel and normalizing the sum to a maximum pixel value of the phase-difference image.

25. (Original) The method of claim 24 further comprising the steps of comparing the value of normalization for the given pixel to a threshold and determining inclusion of the given pixel in the mask image from the comparison.

26. (Original) The method of claim 25 further comprising the step of applying a pre-selected threshold to determine inclusion of the given pixel in the mask image.

27. (Original) The method of claim 25 wherein the pre-selected threshold is set to 0.04 such that those pixels having a value of normalization above 0.04 are excluded from inclusion in the mask image.

28. (Original) A computer readable storage medium having a computer program stored thereon and representing a set of instructions that when executed by a computer causes the computer to:

(A) determine a pulsatility factor for each pixel of a slice of a phase-difference image;

(B) generate a mask image of the slice from only those pixels having a given pulsatility factor;

(C) apply the mask image to the phase-difference image for the slice to mask the phase-difference image along the slice;

(D) repeat (A)-(C) for each slice of the phase-difference image; and

(E) output a corrected phase-difference image with substantial subtraction of background phase.

29. (Original) The computer readable storage medium of claim 28 wherein the set of instructions further causes the computer to apply the mask for each cardiac phase of a measurement period.

30. (Original) The computer readable storage medium of claim 28 wherein the set of instructions further causes the computer to apply the mask along each direction of flow in the slice.

31. (Original) The computer readable storage medium of claim 28 wherein the set of instructions further causes the computer to determine background phase in the phase-difference image with perturbation as a function of inflowing spins along the slice.

32. (Original) The computer readable storage medium of claim 31 wherein the set of instructions further causes the computer to calculate quantitative flow measurements to access flow velocities *in vivo*.

33. (Original) The computer readable storage medium of claim 28 wherein the set of instructions further causes the computer to low pass filter the phase-difference image and Fourier transform the filtered phase-difference image to determine temporal frequency components for each pixel.

34. (Original) The computer readable storage medium of claim 33 wherein the set of instructions further causes the computer to sum first and second harmonics of a power spectrum for each pixel, normalize the sum to maximum pixel value in the phase-difference image, and compare the normalization value of each pixel to a threshold.

35. (Original) The computer readable storage medium of claim 34 wherein the set of instructions further causes the computer to use a pixel in generation of the mask image if the pixel has a normalization value less than the threshold.

36. (Original) The computer readable storage medium of claim 28 wherein the phase contrast image is a speed image of encoded flow along a plurality of flow directions and wherein the set of instructions further causes the computer to determine velocity components along the plurality of flow directions.

37. (Original) The computer readable storage medium of claim 36 wherein the set of instructions further causes the computer to generate an individual power spectrum for the velocity components and determine inclusion/exclusion of a pixel in the mask image from the individual power spectrum for the pixel.

38. (Original) The computer readable storage medium of claim 37 wherein the set of instructions further causes the computer to include the pixel in the mask image if a given percentage of the power spectrum for the pixel is at 0 Hertz.